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ABSTRACT

The borrowing of words by computer sciences from the field of English implies a widespread interest in the relationship between technology and language. To confirm the genealogy of "technological literacy," it would be useful to understand better linguistic literacy. To be literate is to be able to participate in the linguistic interchanges that constitute the social life, work, art, and government of a culture. From that definition follow certain policies about the teaching of literacy. First, believing that one learns to participate in cultural dialogue by degrees, many educators argue that literacy should be taught throughout the curriculum, rather than only in introductory English courses. Second, insofar as English teachers bear a particular responsibility for literacy, many of them try to draw students into dialogue rather than drilling or lecturing them. Third, recognizing that literacy will not automatically promote individual development and critical thinking, many English teachers now pursue those goals deliberately by leading students to take responsibility for their own topics and styles. Technological literacy should be reconceived on the analogy of linguistic literacy, as participation in cultural dialogues about and through technology. The ends of literacy can best be served by teaching the languages of technology "as" languages: symbolic means of understanding and controlling reality. (MS)

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Varieties of Dialogue:
Technological Literacy and Verbal Literacy

Second National STS Conference on Technological Literacy
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There was a little story in the New York Times last month headlined, "English is Property of Aerospace Company." Apparently a brochure describing a particular set of MRP programs includes the statement, "English is a registered trademark of McDonnell Douglas." As the article goes on to explain, "English" is, in this context, the name of a natural-language interface developed by McDonnell Douglas researchers.[1] So McDonnell Douglas didn't really mean to claim that they had invented the mother tongue. Still, calling their query language "English" may seem a bit presumptuous: the name has, after all, been used before.

The same could be said of many technological terms. Having begun my academic career in the department of English and then moved to computer science, I have been surprised at the number of terms from my old field that show up in my new one. Programming languages consist of syntax and semantics; computer science includes, as does English, the study of grammar, communication, information, documentation, and so forth. One of my computer science students, asked to define "documentation," gave the English-class definition by mistake: "documentation," she wrote, "is giving credit to your sources, in footnotes, etc." In her defense, she wrote that in a course that takes its name from the study of language: "Computer Literacy."

[1] New York Times, January 7, 1987.

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Such borrowings imply a widespread interest in the relationship between technology and language. In particular, students of technological literacy might be expected to show a filial concern for the discipline whose name they have inherited. But few of them pay attention to research in verbal literacy. Taking for granted the character of the older field and apparently disinclined to look for family resemblances, they miss the chance to inherit something more than nomenclature—that is, insights and pedagogical approaches.

This morning I would like to confirm the genealogy of "technological literacy" by examining and extrapolating some work in linguistic literacy. I will look first at recent research and then at changes in teaching methods, trying in each case to draw implications for those of us who claim to be extending literacy into new domains.

"Literacy" seems a handy term for borrowing because it comes with a neat definition: the ability to read and write. Moreover, confident statements about literacy levels imply that those two abilities are easily detected and measured. Unfortunately, that straightforward conception of literacy has recently been challenged by historical and cross-cultural studies. What it means to be literate—even what it means to read or to write—varies according to period and culture. Roman orators, for instance, could be "literate" in spoken language; medieval scribes, literate by profession, could write but could not comprehend what they read; many Renaissance men considered themselves illiterate because they could not read Greek; a middle-class American who reads and writes daily may be called illiterate if she spells poorly or knows nothing about Shakespeare. A culture's definition of

literacy, writes Deborah Brandt, "has less to do with overt acts of reading and writing than it does with underlying postures toward language."[2]

If the traditional definition of literacy has been challenged, so have common ideas about its effects. In particular, scholars tell us, literacy is not inherently liberating. That is, increases in the ability to read and write do not always correlate with individual empowerment, economic development, or democratic government. On the contrary, some totalitarian societies have promoted literacy as an instrument of social control, and, according to Robert Pattison, "twentieth-century developmental literacy is usually intended to make [people] harmless, obedient, and productive."[3] Pattison reminds us that "in early Latin, . . . litteratus meant to be branded with a letter of the alphabet—for the Roman forefathers a mark of slavery" (p. 61). To be sure, reading and writing can promote critical thinking, innovation, and self-government, but, in the words of B. V. Street, "The skills and concepts that accompany literacy acquisition . . . do not stem in some automatic way from the inherent qualities of literacy, . . . but are aspects of a specific ideology."[4]

Closely related to such ideas about the effects of literacy are several recent conclusions about the best methods to teach it. Whatever abilities constitute linguistic literacy for a particular culture cannot, evidently, be taught directly or in isolation. For instance, drill and practice in

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[2] D. Brandt, "Versions of Literacy," College English, vol. 47, pp. 128-29.

[3] Robert Pattison, On Literacy: The Politics of the Word from Homer to the Age of Rock (Oxford University Press, 1982), p. 129.

[4] B. V. Street, Literacy in Theory and Practice (Cambridge University Press, 1984), p. 1.

mechanical skills--grammar, punctuation, and so forth--does not improve students' writing; to quote Erika Lindemann, "research does not support the notion that learning grammar is useful in attaining any other goal, except learning grammar."[5] Moreover, many scholars maintain that literacy should not be taught in separate "elementary" courses. Jay Robinson disputes the common notion of reading and writing as "basic skills" or "fundamental tools," because that idea implies "that a language must be learned, a voice acquired, before conversation can begin." He prefers the vision of Maxine Greene "that literacy ought to be conceived as an opening, a becoming, never a fixed end."[6]

The conclusions about verbal literacy that I have outlined thus far are primarily corrective--challenges to longstanding assumptions. As such, they can controvert parallel assumptions about technological literacy. For instance, if linguistic literacy does not consist of monolithic "basic skills," it cannot provide a precedent for those who seek to identify technological literacy with a tidy set of technical skills. In other words, our search for a universal operational definition of technological literacy is probably futile. Studies of verbal literacy also warn us that teaching technological skills and information will not necessarily give our students more control over technology or more of its benefits; rather, those aims must be deliberately incorporated into the design of our courses. Finally, we should not expect technological skills to emerge from direct instruction in

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[5] Erika Lindemann, A Rhetoric for Writing Teachers (Oxford University Press, 1982), pp. 113-14.

[6] Jay L. Robinson, "Constitutive Literacy: The Department of English Revisited," Profession '86, Modern Language Association, December 1986, pp. 36-37; citing Maxine Greene, "Literacy for What?", Phi Delta Kappan, January 1982, p. 326.

techniques or syntactic rules, for in teaching writing, such instruction has proved to be a dead end.

At this point we may legitimately ask whether there have been any constructive findings about linguistic literacy: how, in the 1980s, are reading and writing defined and taught? No simple answer can be given, but most teachers of linguistic literacy at the college level now conceive of it as admission to a cultural dialogue. To be literate is to be able to participate in the linguistic interchanges that constitute the social life, work, art, and government of a culture. From that definition follow certain policies about the teaching of literacy.

First, believing that one learns to participate in cultural dialogue by degrees, many educators argue that literacy should be taught throughout the curriculum, rather than only in introductory English courses. Second, insofar as English teachers bear a particular responsibility for literacy, many of them try to draw students into dialogue rather than drilling or lecturing them. Such teachers devote most of their class time to active, critical reading and--pre-eminently--to expository writing.

Third, recognizing that literacy will not automatically promote individual development and critical thinking, many English teachers now pursue those goals deliberately by leading students to take responsibility for their own topics and styles. A consensus has emerged that being able to discover and develop one's own topic--what Aristotle called the art of invention--is central to being able to write. Moreover, several researchers recommend that the topics of papers should not always be "transactional" (practical or functional); some should be "expressive" (more personal and less structured). Students who have done expressive writing can communicate more clearly and

effectively with a public audience:[7] evidently they really learn to write only when they try to express their own ideas.

A fourth change concerns the activities through which writing is taught. Mass instruction, drill, and solitary revision have largely given way to discussions of essays, including those the students write. In individual conferences with the instructor and in peer-group "workshops," students submit their drafts to actual readers and witness those readers' responses. Reading and writing become, then, an active dialogue.

The ideas of writing teachers may seem a distant model for technological literacy. We should recall, however, that "technology" comes from Greek terms for "skill" and "language": originally technology was a way of talking about skill. I propose that we reconceive technological literacy, on the analogy of linguistic literacy, as participation in cultural dialogues about and through technology. In practice, such a definition could influence our teaching in several ways.

For one thing, it would reinforce current efforts to distribute technological literacy across the curriculum. John Kemeny has already cited the "writing-across-the-curriculum" movement as a precedent for incorporating computer literacy into various courses.[8] More broadly, during the past decade the Alfred P. Sloan Foundation has funded projects to infuse quantitative and technological methods into courses at liberal arts colleges. Such projects demand that teachers in all areas be willing and able to incorporate

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[7] J. Britton, T. Burgess, N. Martin, A. McLeod, and H. Rosen, The Development of Writing Abilities (11-18) (Macmillan Education Ltd., 1975), p. 193; R. W. Winterowd, ed., Contemporary Rhetoric: A Conceptual Background with Readings (Harcourt Brace, 1975), pp. 10-13.

[8] John G. Kemeny, "The Case for Computer Literacy," Daedalus, vol 112 (1983), p. 228.

technological literacy into their syllabi—a tall order, but one that may be easier to fill if we envision technological literacy not as a set of technical skills or information, but as the ability to communicate through and about technology. Sometimes that will mean using quantitative methods or symbol-processing machines. In other cases, those methods and machines will themselves be the objects of critical discussion, conducted from the perspective of a nontechnical discipline.

Those courses that focus particularly on technological literacy might concentrate, like English courses, on participation in dialogue. That would rule out two pedagogical approaches often proposed: on the one hand, simply informing students about technology and its social implications; on the other hand, simply teaching them a programming language. I do not mean that technology awareness and computer programming cannot foster genuine literacy, simply that they will not do so in themselves. If students in an STS course carry out design projects, technology assessment projects, and critical discussions both within and beyond the class, they begin to participate in the conversations that shape technology policy. Alternatively, a programming course can teach students to participate in the conversations that control technology itself—provided that the focus is not on syntactic rules and standard algorithms but on what two recent writers identify as the essence of programming: "to construct mechanisms and explanations" and to "control a reconstructible medium."[9] For those lessons, incidentally, powerful applications software or programmable machinery might serve as well as a programming language. In any case, the aim should be to guide students toward

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[9] Elliot Soloway, "Learning to Program = Learning to Construct Mechanisms and Explanations," Comm. ACM, vol. 29, no. 9 (September 1986), 850-58; Andrea A. diSessa and Harold Abelson, "Boxer: A Reconstructible Computational Medium," Comm. ACM, vol. 29, no. 9 (September 1986), 859-68.

self-expression in some new "language"--a programming language, mathematical techniques, statistical analysis, procedures for problem-solving, technology assessment, or the command-sets of commercial software.

Technological literacy might also borrow specific teaching methods from linguistic literacy—for instance, the emphasis on the arts of invention. If literacy is cultural dialogue, those who participate should have some control over the choice of topic. Thus students should occasionally propose and design their own projects, rather than working on set assignments. In that way they can learn not only how to solve technological problems but also how to discover them, to define them coherently, and to select among them. Moreover, like writing teachers, teachers of technological literacy might give students opportunities to learn from feedback--human as well as mechanical. That is, we might hold regular individual conferences to discuss students' programs or projects, as do writing teachers. We might also organize "workshops" in which students examine and critique each others' work, creating on a small scale the kind of dialogue required for the democratic control of technology.

Like McDonnell Douglas's trademark "English," the term "technological literacy" strikes some people as presumptuous--at best a loose metaphor, at worst a piece of advertising "hype." In self-defense, we should be able to explain why we use "literacy" rather than referring simply to "technological awareness" or "education about technology." The commonest explanation--that we're referring to a new kind of "basic skills," as fundamental as reading and writing--is itself a piece of promotion; we should not call our area of study by a name that begs the question of the area's importance. A more defensible reason for using "literacy" is to give notice that we intend this new kind of knowledge to resemble verbal literacy not necessarily in importance, but in

kind. Technology offers new subjects for dialogue, new kinds of language, and even a new conversational partner—the inanimate world. Whether or not the languages of technology must be taught to every student, we can best serve the ends of literacy by teaching them as languages: symbolic means of understanding and controlling reality.